

Pollution Prevention Fact Sheet

Fiberglass Fabrication

Utah Department of Environmental Quality

Promoting a Healthy Environment

Introduction

Fiberglass products are manufactured through a process of open molding or laminating of thermosetting plastics to produce what are known as fiberglass reinforced and composite plastics. The most common products are fiberglass boats, but other products include furniture, corrosion resistant equipment, cultured marble bath fixtures, bathtubs, heat exchanger components, floating pier modules, large storage tanks, truck body components, and machinery housings.

Operations

While the composition, shape, and size of fiberglass reinforced plastics (FRP) products vary significantly from one facility to the next, and from one production line to the next, the mold-based fabrication process is very similar. Most FRP facilities use the following unit processes:

- Mold preparation
- Gel coating and laminating
- Tool and equipment clean-up
- Operation of secondary systems (e.g. air filtration and ventilation, resin/gel coat transfer and storage)
- Operation of finish lines (e.g. upholstery, painting, etc.)

Along with these central processes and techniques, some facilities also have pipe fitting and lining systems, and/or use closed-mold systems and centrifugal molding systems.

FRP products require certain raw material inputs as well. The following are examples of the categories or specific raw materials used in manufacturing reinforced fiberglass:

- Mold release agents - typically wax or a polymer coating.
- Dirty rags - for equipment and mold cleaning.
- Styrene - serves as a solvent and as a co-reactant in the polymerization process.
- Paints, thinners, and adhesives.
- Foaming agents.
- Solvated resin - surround and hold fibers to create composite material.

- Initiators and catalysts.
- Reinforcement - most commonly glass fiber, but aramid and carbon fibers are also sometimes used.

Pollution Prevention Rational

1. Fiberglass manufactures across the nation regularly use products that are potentially hazardous or dangerous to workers. For example, the laminating process uses resins and catalysts that are flammable. Tool cleanup also often involves using a flammable solvent, like acetone.
2. Fiber glassing activities also generate a steady stream of potentially hazardous air emissions, spent solvents, and other wastes that can impact the environment.
3. FRP fabricators can incur large costs from using processes that generate waste and raw materials that contain toxic components.
5. Complying with regulations, protecting worker health and safety, and as well as good facilities management are all costs that need to be considered when making a decision to use a traditionally toxic material. Finding a less toxic and consequently a less regulated process materials should be considered when possible.
6. Costs of compliance when using materials and processes that have an environmental impact are important considerations. Most often, businesses usually only account for waste disposal costs rather than considering all of the associated costs with the entire manufacturing process.

Pollution Prevention Opportunities

- Spray Guns Reduce over spray and the amount of product used by:
1. Properly training operators to hold gun perpendicular to the surface and trigger gun at the beginning and end of each pass.
 2. Using air-assisted airless spray guns in place of air-spray guns.
 3. Using high volume/low pressure (HVLP) guns.

- Catalysts Reduce emissions and product use by:
1. Using benzoyl peroxide (BPO) in place of methylethyl ketone (MEKP).
 2. Using higher amounts of cobalt and dimethyl aldehyde (DMA) in place of MEKP.
 3. Using higher amounts of inert filler.

Engineering Controls Reduce product use by:

1. Installing gelcoat timing equipment.
2. Reducing laminate thickness to engineered minimum.
3. Using heaters in production area to improve process efficiency.

Alternative Processes Reduce emissions and product use by:

1. Installing closed-mold system (resin transfer molding).
2. Installing an impregnation system.
3. Installing resin rollers.
4. Installing vacuum-mold or infusion system.
5. Using ABS-backed acrylic sheets in place of fiber lay-up.

Alternative Resins Reduce emissions and product use by:

1. Using resin with lower styrene content.
2. Using heat to reduce viscosity.
3. Using UV-cured, vapor-suppressed or vinyl toluene resins.

Best Management Practices

In addition to the above mentioned pollution prevention opportunities, the adoption of best management practices commonly found in other industries concerned with reducing monetary costs associated with wasted raw materials and environmental and worker health issues have been shown to reduce costs significantly. In this manufacturing sector as in others, many opportunities for savings are found in tool and equipment clean up, general operating practices, waste management, storage and housekeeping, inventory control and training and awareness of employees.

For More Information, Contact:

Environmental Protection Agency 1-800-424-8802.
Division of Solid & Hazardous Waste (801) 538-6170.
Environmental Hotline (800) 458-0145
Pollution Prevention Coordinator (801) 536-4477

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